State Water Survey Division
CLIMATOLOGY AND METEOROLOGY SECTION
AT THE
UNIVERSITY OF ILLINOIS

ENR
Illinois Department of
Energy and Natural Resources

SWS Contract Report 320

ILLINOIS SOLAR RADIATION DATA

Quarterly Summary

January – March 1982

by

L. Keith Hendrie
Climatologist

Quarterly Data Report to Illinois Department of Energy and Natural Resources
Contract: STILENR – ER8SOLAR – 653
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Richard G. Semonin
Principal Investigator

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ILLINOIS SOLAR RADIATION DATA

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ILLINOIS STATE WATER SURVEY

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BACKGROUND

This publication provides solar radiation data for Illinois for the quarter commencing January 1982 and derived from measurements made at Illinois Climate Network (ICN) sites. The Illinois State Water Survey, funded by the Illinois Department of Energy and Natural Resources began the installation of solar and wind monitoring instrumentation at these sites in May 1981. Prior to the establishment of these sites, the only long-term, reliable, and high quality solar radiation data set was that recorded at the Argonne National Laboratory, Lemont from 1950 to present, and as suggested by Hendrie (1981), records from this location show a marked downwards trend, at least part of which can be attributed to the suburban spread into the area. The ICN data for 1981 are provided in Hendrie (1983), and data for periods following 1981 are contained in Quarterly Summaries of this type.

SITES

The ICN sites at which solar radiation data are monitored have been carefully selected to provide both a good spatial representation of the state, and the best possible exposure for the instrumentation. The selection criteria adopted for this purpose are provided in Hendrie (1983). The measurement sites used are shown in Figure 1. The detailed locational information, current status, and the dates of commencement of the solar records for each of the sites are listed in Table 1. Three types of sites exist at present; fully

Figure 1. Current status of the Illinois Climate Network sites. Solid stars = fully operational sites (FOS); Open stars = partially operational sites - awaiting recorders (POS); Solid dot = Cooperative Agency Site (CAS); Open square = site under negotiation.

operational sites (FOS), partially operational sites (POS - awaiting the provision of certain pieces of equipment), and one cooperative agency site (CAS - Argonne National Laboratory). It is expected that all sites will be fully operational by mid- to late-summer 1983. Further details of these sites can be obtained from Hendrie (1983).

Table 1. Location and evaluation above mean sea-level for each solar radiation monitoring site.

Location	County	Latitude (N)		Longitude (W)		Elevation (m)	Type of Site
Argonne NL	Cook	41	42	87	58	221	CAS
Belleville	St. Clair	38	31	89	53	133	POS
Brownstown	Fayette	38	57	88	57	177	FOS
Carbondale	Jackson	37	43	89	14	137	POS
Champaign	Champaign	40	07	88	14	219	FOS
De Kalb	DeKalb	41	51	88	51	265	FOS
Dixon Springs	Pope	37	27	88	40	165	FOS
Freeport	Stephenson	42	17	89	40	265	POS
Ina	Jefferson	38	08	88	55	130	POS
Monmouth	Warren	40	65	90	45	229	FOS
Olney	Richland	38	44	88	06	134	POS
Peoria	Tazewell	40	42	89	32	207	POS
Perry	Pike	39	48	90	50	206	FOS
Springfield	Sangamon	39	31	89	37	177	POS
St. Anne	Kankakee	41	03	87	42	194	POS

INSTRUMENTATION

Each site is equipped with an Eppley 8-48 Black and White Pyranometer set on a stand at a height of about 2 meters, and connected to an Eppley 411-6140 Integrator and Digitec 6100 Printer or a Climatronics IMP-831 Data Acquisition System. These recording systems provide hourly integrations of the incoming solar flux. The glass domes of the pyranometers are cleaned each day with methanol by on-site personnel, and calibration checks are made at least once per year by cross-comparison with a standard pyranometer maintained at the

Water Survey laboratories for that purpose. The data recorded are entered onto disk storage on the University of Illinois CYBER computer, and are then checked for outliers and verified before being published. Regular maintenance and site checks are performed by Water Survey staff at least once each month. Greater detail of the equipment used, maintenance and calibration procedures adopted, and instrument performance are provided in Hendrie (1981, 1983).

DATA ACCURACY, UNITS USED, & UNIT CONVERSION FACTORS

It is expected that the data provided by the ICN instrumentation is accurate to within 2.5% of actual values for most periods of the day. There is likely to be a greater error factor near sunrise and sunset, possibly up to about 10% under some conditions. However, since the incoming solar radiation at these times is very small anyway, the overall accuracy of the daily data as presented in this summary is still expected to lie within 2.5% of actual values.

The solar data presented in this summary represent the daily flux density of global shortwave radiation received on a horizontal upfacing surface. Global shortwave radiation is defined as the sum of the direct and diffuse beam radiation received from the sun, and having a spectral distribution of wavelengths of about 0.3 to 3.0 μm. The units used in this report to quantify the solar flux received at the surface are watts per square meter (Wm^{-2}) for hourly data, and mega-joules per square meter (MJm^{-2}) for daily and monthly totals.

If hourly values of the incoming solar flux are required for one or more of the ICN sites, arrangements can be made to obtain them from the Illinois State Water Survey by contacting the Unit Head, Climate Information Unit,

Illinois State Water Survey, Box 5050, Station A, Champaign, Illinois 61820. These hourly values are available in W m^{-2}, cal cm^{-2}, or BTU ft^{-2}.

In the case that alternative units would be preferred, the conversion factors listed in Table 2 can be utilized.

MEAN LONG-TERM DISTRIBUTION OF SOLAR RADIATION OVER ILLINOIS

As of yet insufficient solar radiation data have been received from the ICN sites to develop any reliable long-term mean solar radiation values. Hendrie (1981, 1983) developed estimates of long-term monthly and annual means based upon solar data from the NOAA SOLMET national network stations closest to Illinois in conjunction with sunshine data for Illinois and some other nearby stations. These values are plotted in Figures 2A, 2B, and 3, and the patterns obtained seem quite reasonable, being fairly similar to those of SERI (1981). In addition to the obvious seasonal trends, these data show a latitudinal gradient to exist in all months, with the highest values being in the south. Additionally, in all months, and to a much more noticeable degree in the warmer months, a west to east decrease in the solar flux received at the surface occurs in response to increasing cloudiness as you move eastwards from the Mississippi Valley. Consequently, the overall maximum values occur in the southwest of the state and minimum values in the northeast. The units used in Figures 2A, 2B and 3 can be converted to other types if desired by using the unit conversion factors listed in Table 2.

DISTRIBUTION OF SOLAR RADIATION OVER ILLINOIS THIS QUARTER

The accompanying data tables at the end of this report provides daily solar radiation data for this quarter for the ICN sites currently equipped

Table 2. Some useful unit conversion factors for solar radiation values.

	TO CONVERT	TO	MULTIPLY BY
ENERGY	BTU	kWh	2.931×10^{-4}
	BTU	kcal	2.520×10^{-1}
	BTU	J	1.055×10^{3}
	kWh	kcal	8.600×10^{2}
	KWh	MJ	3.600
	kcal	J	4.186×10^{3}
ENERGY DENSITY	BTU ft^{-2}	kcal cm^{-2}	2.712×10^{-4}
	BTU ft^{-2}	MJ m^{-2}	1.141×10^{-2}
	BTU ft^{-2}	kJ m^{-2}	1.141×10
	kcal cm^{-2}	kWh m^{-2}	8.600×10^{6}
	kcal cm^{-2}	MJ m^{-2}	4.186×10^{5}
	kWh m^{-2}	MJ m^{-2}	3.600
	kWh m^{-2}	kJ m^{-2}	3.600×10^{3}
ENERGY FLUX DENSITY	BTU ft^{-2} h^{-1}	W m^{-2}	3.155
	BTU ft^{-2} h^{-1}	kJ m^{-2} h^{-1}	1.141
	BTU ft^{-2} h^{-1}	MJ m^{-2} d^{-1}	1.739×10^{-2}
	BTU ft^{-2} h^{-1}	ly h^{-1}	2.726×10^{-2}
	BTU ft^{-2} h^{-1}	ly d^{-1}	6.542×10^{-1}
	ly h^{-1}	W m^{-2}	1.163×10
	ly h^{-1}	kJ m^{-2} h^{-1}	4.186×10
	cal cm^{-2} h^{-1}	ly h^{-1}	1.000
	TO DERIVE	FROM	DIVIDE BY

Note:
1 W = 1 J s^{-1}
1 ly = 1 cal cm^{-2}
1 MJ = 1000000 J
1 kcal = 1000 cal

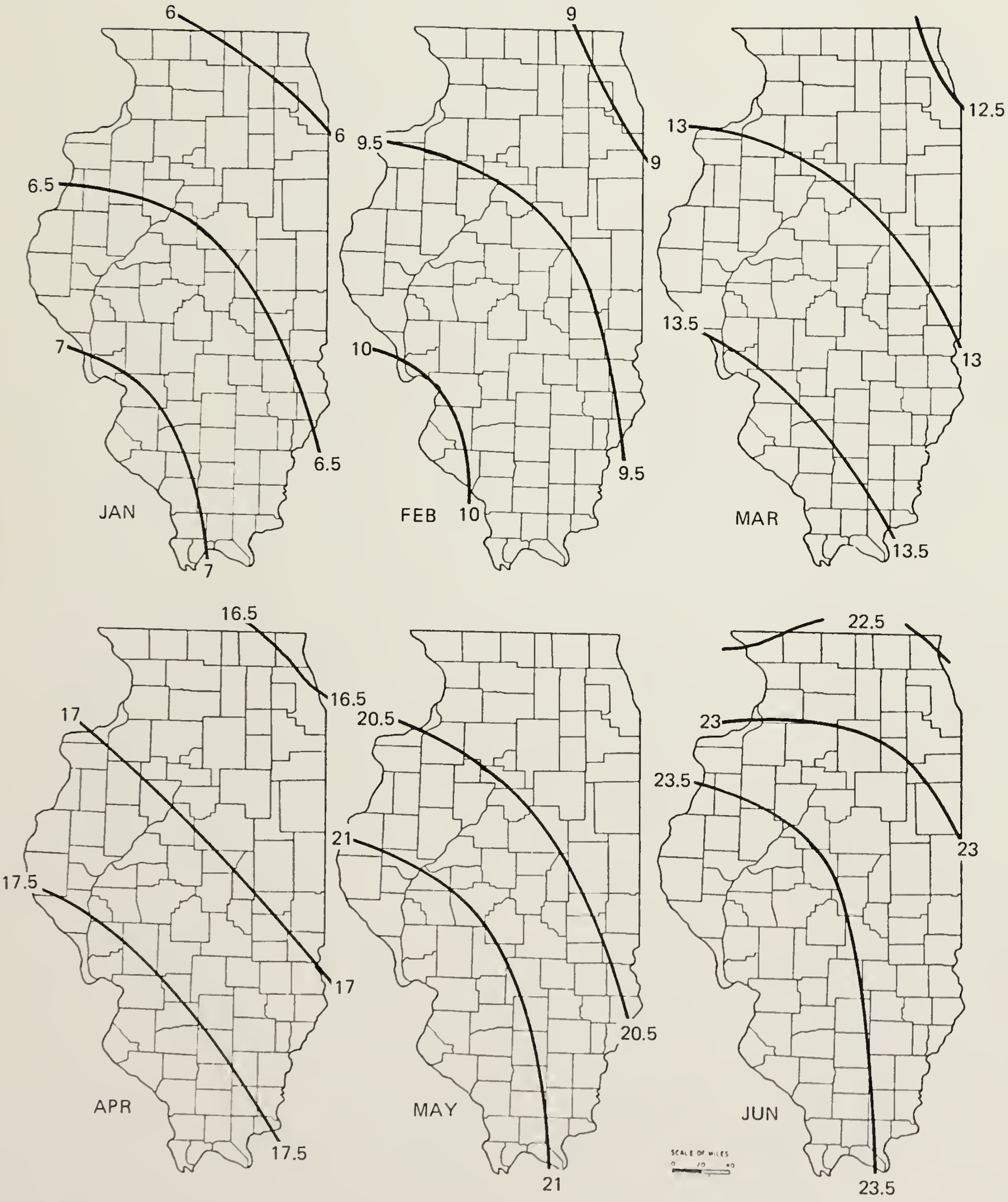

Figure 2A. Monthly means of daily solar radiation ($MJm^{-2}d^{-1}$).

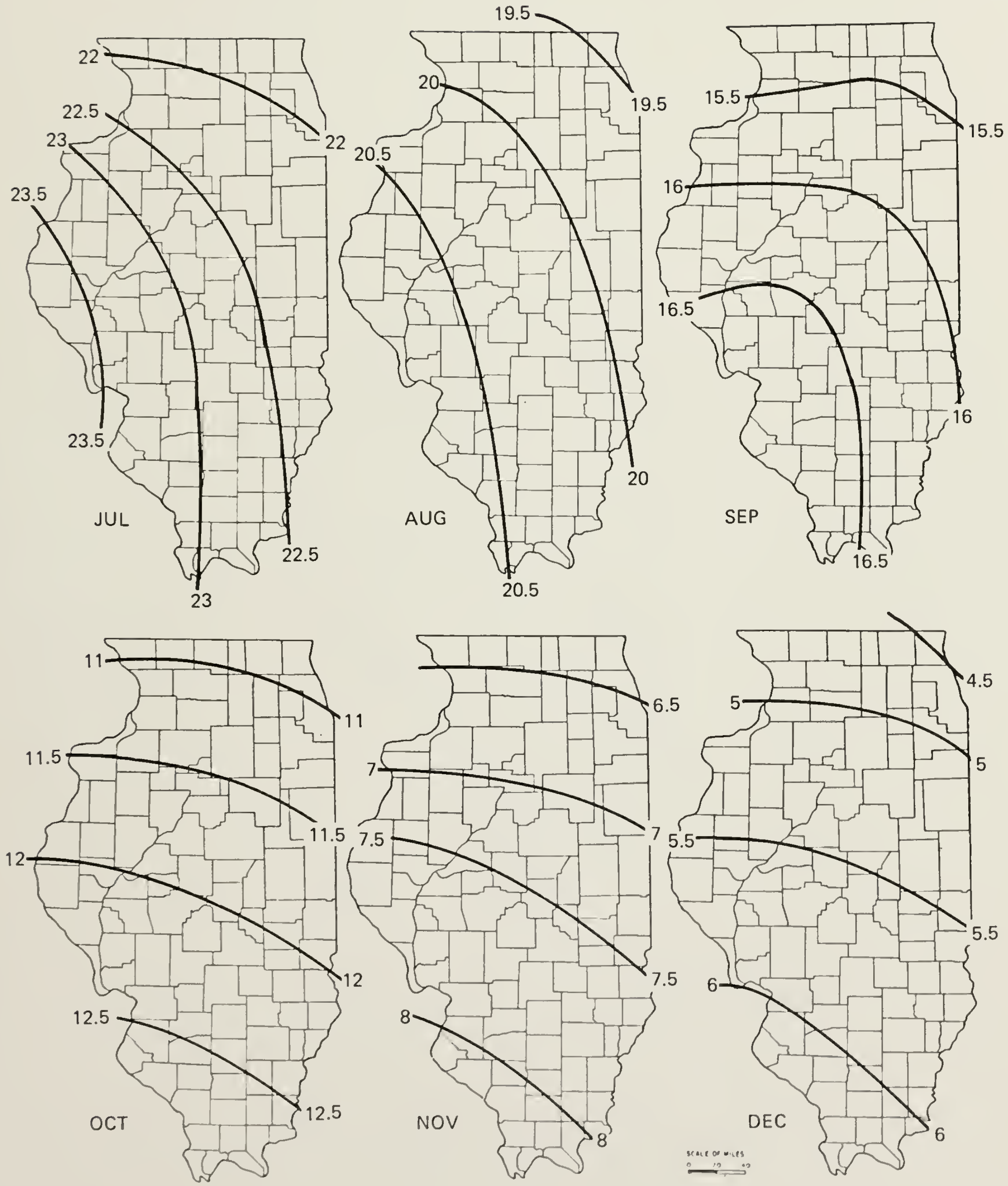

Figure 2B. Monthly means of daily solar radiation ($MJm^{-2}d^{-1}$).

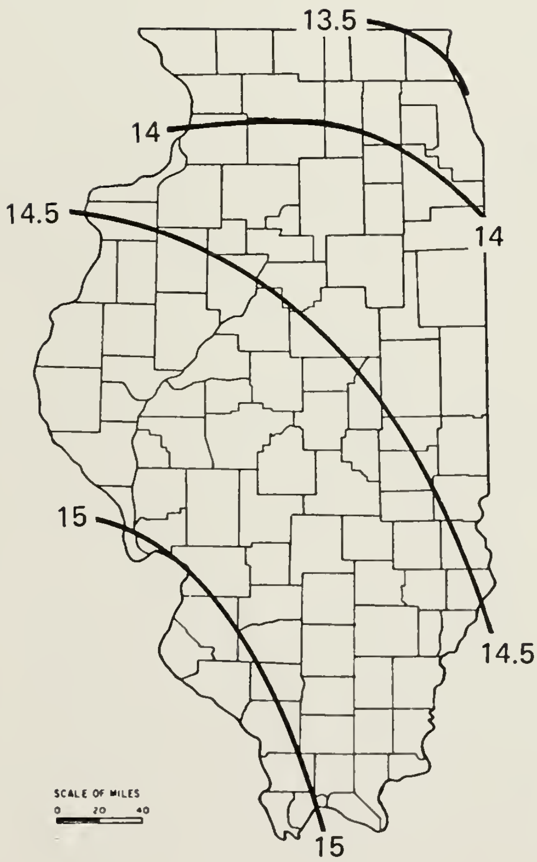

Figure 3. Annual mean daily solar radiation ($MJm^{-2}d^{-1}$).

with operative solar monitoring and recording instrumentation. The units used are mega-joules per square meter, but these values may be changed to alternative units by use of the unit conversion factors listed in Table 2. Tables 3, 4, and 5 provide various summary analyses of these data, and Figure 4 gives the spatial patterns that they represent.

Table 3 provides a comparison of the total solar radiation measured at each of the ICN sites during each month of this quarter with that expected according to the corresponding estimated long-term mean. These data show that for each month there was an above-average receipt of global radiation measured at most stations, and that for February all locations recorded values well above the long-term estimates.

Tables 4 and 5 offer two ways of viewing the data for probabilities of the occurrence of solar income achieving different thresholds. These tables are useful if it is necessary to determine the probability of a particular threshold irradiance being achieved at a given location during different times of the year. However, it must be cautioned that these data are for the first quarter of 1982 only, and that on their own do not necessarily provide a useful indicator of the corresponding long-term probabilities. Table 4 provides for each station the percentage of days in each month of the quarter during which the total solar receipt exceeded pre-selected values. These data if used in conjunction with deviations from the monthly means should be useful in giving first estimates of the availability of solar energy on horizontal surfaces around the state. As the ICN data base increases, the corresponding long-term statistical estimates of these values will be computed at the State Water Survey, and provided in this publication.

Table 3. Comparison of global solar radiation received on a horizontal surface during this quarter to the estimated long-term mean values for the same sites.

	% differences of measurement from estimate		
SITE	JAN 1982	FEB 1982	MAR 1982
Brownstown	*	+16	+3
Champaign	+1	+13	-6
De Kalb	+20	+14	0
Dixon Springs	+12	+6	+10
Monmouth	+10	+6	+1
Perry	*	+7	-6

NOTE: * = a significant loss of data occurred during this month at this site, and no reliable estimate could be made for this table.

Table 4. Percentage of days in each month of this quarter when the total daily global solar radiation exceeded values of 5, 10, 15, 20 and 25 MJ m^{-2}.

		> 5 MJ	> 10 MJ	> 15 MJ	> 20 MJ	> 25 MJ
(1)	JAN. 1982:					
	Brownstown	*	*	*	*	*
	Champaign	58	13	0	0	0
	De Kalb	74	19	0	0	0
	Dixon Spr.	65	35	0	0	0
	Monmouth	73	23	0	0	0
	Perry	*	*	*	*	*
(1)	FEB. 1982:					
	Brownstown	86	59	32	0	0
	Champaign	82	64	18	0	0
	De Kalb	82	64	11	0	0
	Dixon Spr.	71	50	29	0	0
	Monmouth	79	61	14	0	0
	Perry	83	61	22	0	0
(1)	MAR. 1982:					
	Brownstown	87	65	52	26	0
	Champaign	84	55	35	16	0
	De Kalb	84	61	45	13	0
	Dixon Spr.	84	71	52	26	0
	Monmouth	81	58	48	23	0
	Perry	80	63	40	17	0

NOTE: * = insufficient data obtained at this site during this month to provide reliable values for this table.

Table 5. Various percentile values of daily total incoming solar radiation (MJ m^{-2} d^{-1}) at ICN sites during each month of this quarter.

SITE	MONTH	10	25	50	75	90
BROWNSTOWN	JAN	*	*	*	*	*
	FEB	3.3	7.2	13.3	15.6	17.0
	MAR	3.7	6.5	14.8	20.3	22.0
CHAMPAIGN	JAN	2.8	3.2	7.3	9.1	11.8
	FEB	5.0	7.6	11.3	14.6	15.9
	MAR	6.1	7.4	10.7	17.7	21.7
DE KALB	JAN	4.1	4.3	7.6	9.7	10.9
	FEB	3.5	7.5	11.1	14.0	15.0
	MAR	4.2	6.5	13.8	19.0	21.4
DIXON SPR.	JAN	2.0	3.5	9.3	12.0	13.2
	FEB	2.8	4.0	9.8	16.0	17.5
	MAR	5.1	9.3	16.4	20.6	23.3
MONMOUTH	JAN	2.1	4.6	7.4	9.8	11.1
	FEB	2.4	6.3	10.7	14.7	15.3
	MAR	3.2	5.8	15.5	19.6	21.5
PERRY	JAN	*	*	*	*	*
	FEB	2.1	6.5	10.5	15.0	16.4
	MAR	3.3	5.1	13.0	18.4	22.0

NOTE: * = insufficient data obtained during the month at this site to obtain reliable values for this table.

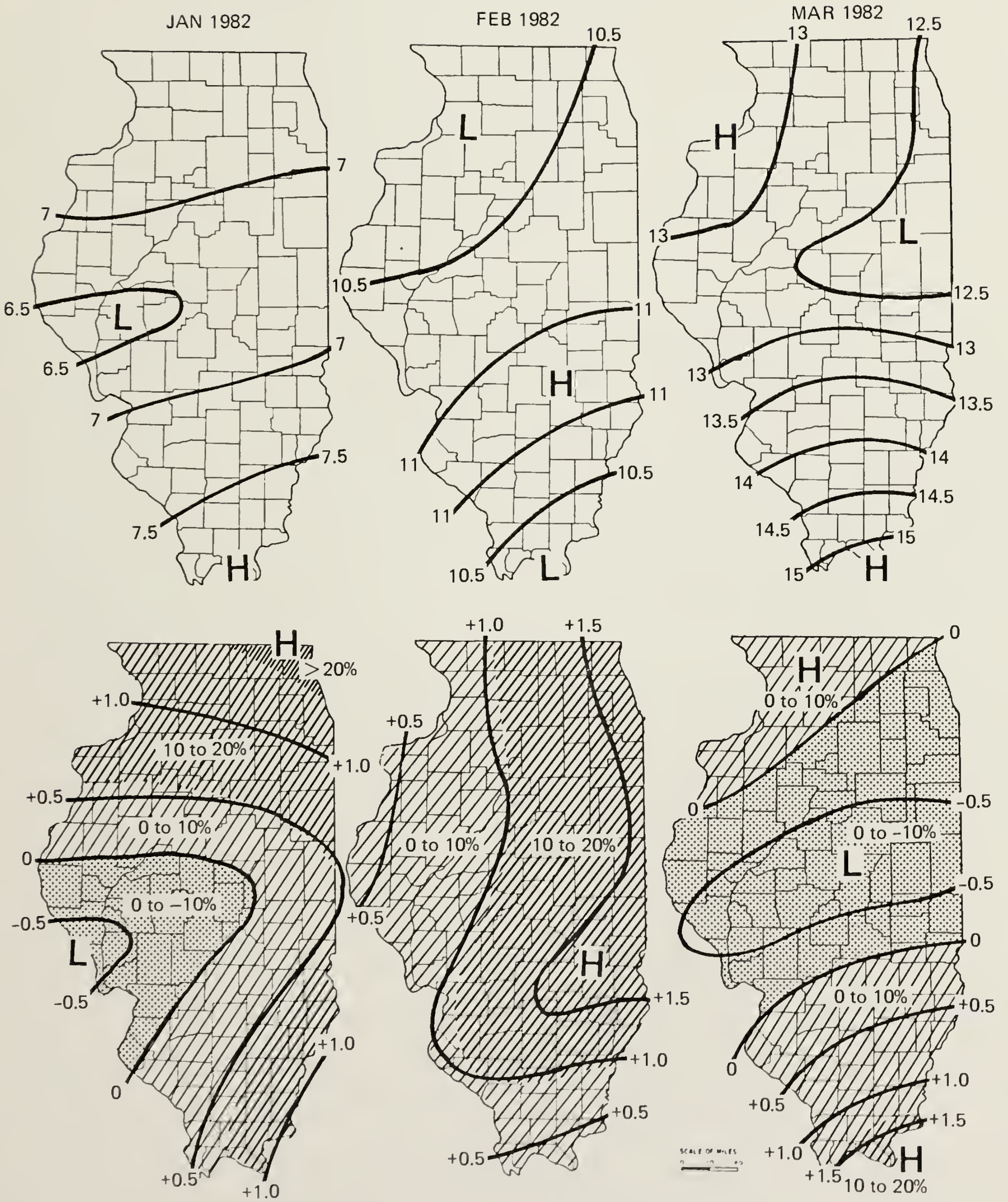

Figure 4. Upper; Distribution of monthly values of mean daily incoming solar radiation (MJ m^{-2}) for January-March 1982.

Lower; Distribution of deviations of 1982 measurements from long-term estimates (MJ m^{-2} d^{-1}) for the same months.

The data provided in Table 5 shows selected percentile values of incoming solar radiation (MJm^{-2}) at each of the ICN sites for each month of the quarter. These percentiles represent the percentage of days at that site and during that month for which the total solar radiation received was less than that listed. These data should also be useful for planning purposes, and again, as the ICN data base expands similar statistics will be generated for the full length of record.

The top set of maps in Figure 4 show the patterns of distribution of the mean daily incoming solar radiation in MJm^{-2} for each of the 3 months, and by comparing these patterns with those in Figures 2A and 2B deviations from the estimated long-term mean can be determined. The lower set of maps shows the distribution of these differences from the long-term mean values in MJm^{-2}, and has differential shading to reveal positive and negative anomalies in excess of 10% and 20%.

During January 1982 there was an E-W band of minimum solar income across the central section of the state, with the lowest values in the central-east. The highest values for the month occurred in the south. Almost all of the state received above average solar radiation, with the northern third and the southeast receiving amounts more than 10% greater than normal, and the far northwest receiving 20% more than usual. Only the central southwest had a solar income that was less than average. In the northern portion of the state maximum daily values during January were 11.8-12.2 MJm^{-2}, minimum values were 1.0-2.0 MJm^{-2}, and there were 5-8 essentially cloudless days. The corresponding values for the central section of the state were 12.5 MJm^{-2} and 1.0 MJm^{-2}, with about 8 cloudless days, while for the southern third the values were 12.7-13.8 MJm^{-2} and 0.5 MJm^{-2}, with about 11 cloudless days.

In February 1982 the highest average daily values were received in a SW-NE band across the south-central area of the state, with the lowest values occurring in the northwest. As revealed by Figure 4 all of the state benefitted from an above average receipt of solar energy during February, with most of the eastern half gaining in excess of 10% above the mean. Maximum daily values in the northern third of the state were 17.4-17.8 MJm^{-2}, minimum values were 1.5-2.5 MJm^{-2}, and there were 9-11 essentially cloudless days. In the central area of the state the comparable measurements were 17.6-18.1 MJm^{-2} and 1.0-1.5 MJm-2, with 10-12 cloudless days, while for the southern region they were 17.6-18.6 MJm^{-2} and 2.3-2.8 MJm^{-2}, with 8-10 cloudless days.

During March 1982 the southern third of the state gained a significantly greater solar input to the surface than any other region, with daily average values reaching 15 MJm^{-2}. The minimum values for the month occurred in the northeast, and were less than 12.5 MJm^{-2}. A broad WSW-ENE band across the central region of the state received less than average solar income, and only in the far southern tip was the positive anomaly in excess of 10%. The northern third of the state received maximum daily solar incomes of 23.3-23.5 MJm^{-2}, minimum values of 1.2-1.8 MJm^{-2}, and experienced 12-13 essentially cloudless days. During the same period the central section received maximum daily values of 23.1-23.2 MJm^{-2}, minimum values of 1.2 MJm^{-2} and had about 10 cloudless days, while the southern region received maximum values of 23.9-24.7 MJm^{-2}, minimum values of 2.5-3.3 MJm^{-2}, and had 10-12 cloudless days.

REFERENCES

Hendrie, L. K., 1981: Illinois Solar Weather Program. Illinois State Water Survey, Contract Report 276, 42 pp.

Hendrie, L. K., 1983: Illinois Solar Weather Program. Illinois Department of Energy and Natural Resources, Doc. No. 83/10, and Illinois State Water Survey, Contract Report 304, 75 pp.

Solar Energy Research Institute, 1981: Solar radiation energy resource atlas of the United States. U.S. Dept. of Energy, SERI/SP-642-1037, October 1981, 167 pp and appendices.

DAILY SOLAR RADIATION DATA TABLES FOR THIS QUARTER

The following tables provide daily totals of global solar radiation (MJ m^{-2}) on a horizontal surface at each of the ICN sites equipped with the appropriate monitoring instruments. Global radiation represents the summation of the direct and diffuse components of the incoming solar beam.

Each page of data has the site to which it refers printed in the upper left corner along with the appropriate latitude, longitude and elevation above mean sea-level. There are two columns for each month, the first containing the daily solar radiation received in units of MJ m^{-2}, and the second (labelled #H) the number of hours of acceptable data used to generate the value in the first column. If #H is less than 24, it means that there was some data loss during that 24-hour period, and any such days were ignored in any further statistical analysis. The symbol M represents unavailable, missing, or unreliable data. The five rows at the bottom of each table provide the monthly total solar radiation (M TOT), the number of complete days of acceptable data (# DAYS) available, the average daily receipt of solar radiation (DAY AV) for that month, the maximum daily value (D MAX) for that month, and the minimum daily value (D MIN) for the month.

If alternative units are desired, the unit conversion factors listed in Table 2 can be used.

LKH 5/81

BROWNSTOWN, ILLINOIS
88 57'W. 38 57'N
177 M ABOVE MSL

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

YEAR: 1982

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H	MJ/M2	#H
1	1.67	10	M	0	16.85	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	M	0	M	0	6.50	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	M	0	M	0	3.46	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	M	0	.41	8	3.49	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	M	0	5.99	24	15.34	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	M	0	15.57	24	7.59	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	M	0	15.61	24	18.99	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	M	0	7.33	24	11.17	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	M	0	14.08	24	16.24	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	M	0	13.51	24	12.36	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	M	0	15.65	24	14.26	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	M	0	6.70	24	5.13	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	M	0	13.19	24	20.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	M	0	15.93	24	5.73	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	M	0	8.82	24	3.93	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	M	0	2.75	24	19.80	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	M	0	3.54	24	8.35	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	M	0	2.96	24	13.00	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	M	0	7.44	24	2.64	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	M	0	6.48	24	17.04	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	M	0	15.41	24	17.81	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	M	0	16.57	24	21.81	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	M	0	0.00	6	21.71	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	M	0	.03	13	20.44	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	M	0	12.62	24	7.93	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	1.00	9	13.28	24	18.26	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	12.02	24	17.55	24	22.26	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	12.73	24	17.62	24	23.52	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	5.57	24			20.38	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	.67	24			5.17	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	.02	8			23.85	24			M	0			M	0	M	0			M	0			M	0
M TOT	31.00		248.61		425.28		M		M		M		M		M		M		M		M		M	
# DAYS	4		22		31		0		0		0		0		0		0		0		0		0	
DAY AV	7.75		11.30		13.72		M		M		M		M		M		M		M		M		M	
D MAX	12.73		17.62		23.85		M		M		M		M		M		M		M		M		M	
D MIN	.67		2.75		2.64		M		M		M		M		M		M		M		M		M	

LKH 5/81

CHAMPAIGN, ILLINOIS
88 57'W. 40 03'N
219 M ABOVE MSL

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

YEAR: 1982

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY MJ/M2	#H	FEBRUARY MJ/M2	#H	MARCH MJ/M2	#H	APRIL MJ/M2	#H	MAY MJ/M2	#H	JUNE MJ/M2	#H	JULY MJ/M2	#H	AUGUST MJ/M2	#H	SEPTEMBER MJ/M2	#H	OCTOBER MJ/M2	#H	NOVEMBER MJ/M2	#H	DECEMBER MJ/M2	#H
1	9.12	24	13.20	24	14.16	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	3.10	24	11.01	24	2.78	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	1.91	24	4.33	24	13.76	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	2.60	24	11.57	24	2.22	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	9.58	24	7.78	24	17.67	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	1.67	24	14.75	24	7.61	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	9.52	24	14.50	24	16.99	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	7.97	24	9.03	24	8.49	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	9.93	24	13.87	24	16.04	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	8.82	24	14.57	24	11.37	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	7.64	24	15.03	24	9.66	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	4.49	24	7.53	24	4.99	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	8.34	24	8.54	24	19.76	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	7.44	24	14.08	24	8.06	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	4.86	24	10.99	24	2.45	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	8.92	24	1.45	24	14.69	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	4.57	24	5.05	24	5.09	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	7.14	24	1.89	24	7.39	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	3.51	24	4.36	24	1.24	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	3.96	24	10.09	24	10.04	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	2.40	24	15.47	24	7.71	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	1.27	24	15.96	24	17.42	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	7.30	24	11.47	24	21.01	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	11.91	24	3.07	24	18.76	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	8.37	24	11.33	24	8.89	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	11.97	24	14.38	24	14.77	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	11.66	24	17.64	24	22.36	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	12.45	24	16.37	24	23.15	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	5.53	24			20.72	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	1.00	24			7.06	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	2.91	24			22.67	24			M	0			M	0	M	0			M	0			M	0
M TOT	201.86		299.30		378.97		M		M		M		M		M		M		M		M		M	
# DAYS	31		28		31		0		0		0		0		0		0		0		0		0	
DAY AV	6.51		10.69		12.22		M		M		M		M		M		M		M		M		M	
D MAX	12.45		17.64		23.15		M		M		M		M		M		M		M		M		M	
D MIN	1.00		1.45		1.24		M		M		M		M		M		M		M		M		M	

LKH 5/81

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

DE KALB, ILLINOIS
88 51'W. 41 51'N
265 M ABOVE MSL

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

YEAR: 1982

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY MJ/M2	#H	FEBRUARY MJ/M2	#H	MARCH MJ/M2	#H	APRIL MJ/M2	#H	MAY MJ/M2	#H	JUNE MJ/M2	#H	JULY MJ/M2	#H	AUGUST MJ/M2	#H	SEPTEMBER MJ/M2	#H	OCTOBER MJ/M2	#H	NOVEMBER MJ/M2	#H	DECEMBER MJ/M2	#H
1	7.86	24	11.81	24	11.82	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	2.09	24	7.92	24	4.73	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	5.45	24	5.92	24	14.49	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	4.17	24	12.06	24	7.57	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	7.65	24	8.73	24	17.86	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	6.08	24	14.97	24	17.91	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	9.79	24	13.73	24	19.69	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	6.81	24	10.38	24	5.74	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	9.98	24	14.49	24	16.23	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	7.37	24	13.62	24	17.60	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	9.45	24	14.53	24	6.52	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	5.00	24	10.89	24	2.23	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	9.25	24	7.39	24	19.84	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	10.54	24	8.35	24	11.10	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	5.88	24	12.01	24	4.07	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	9.27	24	3.51	24	6.48	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	3.50	24	11.07	24	4.41	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	9.55	24	2.49	24	7.60	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	9.53	24	4.15	24	1.77	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	3.06	24	12.62	24	5.84	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	5.55	24	14.04	24	6.53	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	2.63	24	15.00	24	18.40	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	7.55	24	3.65	24	20.48	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	11.02	24	2.63	24	19.04	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	10.83	24	10.65	24	16.26	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	11.83	24	12.59	24	11.54	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	10.26	24	17.82	24	22.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	11.68	24	16.63	24	22.69	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	4.14	24			19.47	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	3.64	24			13.13	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	3.99	24			23.29	24			M	0			M	0	M	0			M	0			M	0
M TOT	225.40		293.64		396.59		M		M		M		M		M		M		M		M		M	
# DAYS	31		28		31		0		0		0		0		0		0		0		0		0	
DAY AV	7.27		10.49		12.79		M		M		M		M		M		M		M		M		M	
D MAX	11.83		17.82		23.29		M		M		M		M		M		M		M		M		M	
D MIN	2.09		2.49		1.77		M		M		M		M		M		M		M		M		M	

LKH 5/81

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

DIXON SPRINGS, ILLINOIS
88 40'W. 37 27'N
165 M ABOVE MSL

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

YEAR: 1982

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY MJ/M2	#H	FEBRUARY MJ/M2	#H	MARCH MJ/M2	#H	APRIL MJ/M2	#H	MAY MJ/M2	#H	JUNE MJ/M2	#H	JULY MJ/M2	#H	AUGUST MJ/M2	#H	SEPTEMBER MJ/M2	#H	OCTOBER MJ/M2	#H	NOVEMBER MJ/M2	#H	DECEMBER MJ/M2	#H
1	6.33	24	12.77	24	18.02	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	4.28	24	7.30	24	12.27	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	1.62	24	2.75	24	4.97	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	6.79	24	9.76	24	6.16	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	9.88	24	3.26	24	9.78	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	3.33	24	16.07	24	3.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	9.28	24	14.88	24	17.44	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	12.75	24	3.93	24	14.82	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	10.35	24	9.46	24	18.57	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	10.66	24	12.72	24	10.61	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	12.20	24	15.58	24	8.02	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	2.30	24	4.24	24	7.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	3.01	24	16.23	24	19.43	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	9.87	24	16.82	24	3.45	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	6.31	24	3.04	24	16.86	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	11.18	24	3.50	24	18.35	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	9.59	24	2.30	24	20.98	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	9.74	24	2.75	24	14.71	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	4.71	24	10.70	24	14.39	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	3.82	24	11.55	24	16.41	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	2.28	24	17.64	24	20.44	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	.57	24	17.67	24	13.09	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	13.17	24	16.54	24	21.72	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	12.74	24	5.40	24	21.90	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	12.67	24	9.80	24	5.39	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	13.84	24	8.99	24	23.54	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	13.33	24	13.25	24	23.49	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	13.83	24	18.56	24	24.68	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	5.23	24			16.56	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	.41	24			2.71	12	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	2.65	24			22.90	24			M	0			M	0	M	0			M	0			M	0
M TOT	238.72		287.45		449.49		M		M		M		M		M		M		M		M		M	
# DAYS	31		28		30		0		0		0		0		0		0		0		0		0	
DAY AV	7.70		10.27		14.98		M		M		M		M		M		M		M		M		M	
D MAX	13.84		18.56		24.68		M		M		M		M		M		M		M		M		M	
D MIN	.41		2.30		3.28		M		M		M		M		M		M		M		M		M	

LKH 5/81

MONMOUTH, ILLINOIS
90 45'W. 40 65'N
229 M ABOVE MSL

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

YEAR: 1982

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY MJ/M2	#H	FEBRUARY MJ/M2	#H	MARCH MJ/M2	#H	APRIL MJ/M2	#H	MAY MJ/M2	#H	JUNE MJ/M2	#H	JULY MJ/M2	#H	AUGUST MJ/M2	#H	SEPTEMBER MJ/M2	#H	OCTOBER MJ/M2	#H	NOVEMBER MJ/M2	#H	DECEMBER MJ/M2	#H
1	7.25	24	10.47	24	13.50	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	.90	24	7.59	24	1.84	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	3.02	24	5.88	24	13.08	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	7.87	24	10.67	24	9.66	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	9.22	24	10.34	24	18.17	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	6.22	24	14.34	24	18.94	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	10.26	24	14.15	24	20.21	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	7.07	24	9.45	24	7.73	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	10.23	24	14.85	24	14.36	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	7.48	24	12.81	24	18.31	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	9.55	24	14.89	24	8.57	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	4.61	24	8.76	24	3.58	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	11.12	24	11.81	24	19.56	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	11.45	24	11.52	24	6.25	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	6.69	24	10.46	24	2.72	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	9.28	24	1.42	24	4.01	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	4.01	24	2.09	24	3.70	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	6.08	24	3.00	24	5.84	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	9.83	24	4.96	24	1.17	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	2.10	24	12.67	24	9.65	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	.08	9	15.38	24	5.55	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	M	0	15.09	24	20.30	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	M	0	2.19	24	20.80	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	M	0	3.94	24	18.87	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	11.35	16	9.08	24	16.54	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	9.68	24	14.90	24	20.75	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	10.61	24	17.37	24	22.21	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	12.24	24	15.62	24	22.65	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	1.60	24			19.00	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	2.23	24			17.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	5.07	24			23.51	24			M	0			M	0	M	0			M	0			M	0
M TOT	185.68		285.68		408.34		M		M		M		M		M		M		M		M		M	
# DAYS	26		28		31		0		0		0		0		0		0		0		0		0	
DAY AV	7.14		10.20		13.17		M		M		M		M		M		M		M		M		M	
D MAX	12.24		17.37		23.51		M		M		M		M		M		M		M		M		M	
D MIN	.90		1.42		1.17		M		M		M		M		M		M		M		M		M	

LKH 5/81

PERRY, ILLINOIS
90 50'W. 39 48'N
206 M ABOVE MSL

ILLINOIS STATE WATER SURVEY
ILLINOIS SOLAR ENERGY PROGRAM

YEAR: 1982

GLOBAL SHORTWAVE RADIATION
ON A HORIZONTAL SURFACE
SENSOR: EPPLEY 8-48 PYRANOMETER

UNITS: DAILY AND MONTHLY = MJ/M2

MONTH

DAY	JANUARY MJ/M2	#H	FEBRUARY MJ/M2	#H	MARCH MJ/M2	#H	APRIL MJ/M2	#H	MAY MJ/M2	#H	JUNE MJ/M2	#H	JULY MJ/M2	#H	AUGUST MJ/M2	#H	SEPTEMBER MJ/M2	#H	OCTOBER MJ/M2	#H	NOVEMBER MJ/M2	#H	DECEMBER MJ/M2	#H
1	7.50	24	9.99	16	16.02	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
2	.81	24	10.60	24	5.08	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
3	2.07	24	6.46	24	3.28	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
4	.03	8	10.75	24	3.36	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
5	M	0	10.14	24	9.94	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
6	M	0	15.15	24	13.02	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
7	M	0	14.63	24	15.29	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
8	M	0	0.00	7	5.69	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
9	M	0	M	0	12.00	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
10	M	0	M	0	17.79	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
11	M	0	14.99	14	9.66	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
12	M	0	8.25	24	4.24	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
13	M	0	14.97	24	19.09	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
14	M	0	14.46	24	3.23	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
15	M	0	8.49	24	3.51	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
16	M	0	1.00	24	13.11	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
17	M	0	1.63	24	5.11	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
18	9.93	17	2.34	24	11.79	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
19	6.60	24	10.12	24	1.22	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
20	1.78	24	9.82	24	12.65	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
21	1.81	24	15.85	24	.35	8	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
22	1.50	24	15.61	24	21.39	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
23	10.99	24	11.57	24	20.16	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
24	11.11	24	4.15	24	17.40	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
25	9.21	24	6.52	24	14.16	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
26	10.19	24	14.69	24	18.17	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
27	3.49	11	17.60	24	22.39	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
28	M	0	18.05	24	22.71	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
29	M	0			19.31	24	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
30	M	0			14.20	22	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0	M	0
31	M	0			23.06	24			M	0			M	0	M	0			M	0			M	0
M TOT	63.56		242.85		363.80		M		M		M		M		M		M		M		M		M	
# DAYS	11		23		29		0		0		0		0		0		0		0		0		0	
DAY AV	5.78		10.56		12.54		M		M		M		M		M		M		M		M		M	
D MAX	11.11		18.05		23.06		M		M		M		M		M		M		M		M		M	
D MIN	.81		1.00		1.22		M		M		M		M		M		M		M		M		M	